Department of Mathematics & Philosophy of Engineering
Faculty of Engineering Technology
The Open University of Sri Lanka –Nawala, Nuggegoda
Nawala - Nugegoda

Course: MPZ 3132-Engineering Mathematics IB   Model Answer No.03 Academic Year 2011/2012

1. Definition

A matrix is reduced row-echolon form if it satisfies the following requirements.

(i) It is I row-echelon form
(ii) The leading entry in each non zero row is I.
(iii) All other elements of the column in which the leading entry I occurs are zeros.
(iv)

1.1. $3x - 2y + z = 0$
$-11x + 8y + z = 0$
$10x - 7y + z = 0$
$-4x + 3y + z = 0$

1.1.1. $\begin{bmatrix} 3 & -2 & 1 \\ -11 & 8 & 1 \\ 10 & -7 & 1 \\ -4 & 3 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$

When $A = \begin{bmatrix} 3 & -2 & 1 \\ -11 & 8 & 1 \\ 10 & -7 & 1 \\ -4 & 3 & 1 \end{bmatrix}, x = \begin{bmatrix} x \\ y \\ 3 \end{bmatrix}, \underline{0} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$

$AX = \underline{0}$

$\begin{bmatrix} 3 & -2 & 1 \\ -11 & 8 & 1 \\ 10 & -7 & 1 \\ -4 & 3 & 1 \end{bmatrix}$

Applying $R_4 \to R_4 + R_1$, $R_3 \to R_2 + R_3$

$$\begin{bmatrix} 3 & -2 & 1 \\ -11 & 8 & 1 \\ -1 & 1 & 2 \\ -1 & 1 & 2 \end{bmatrix}$$

Applying $R_4 \to R_4 - R_3$, $R_1 \to R_1 + 2R_4$, $R_3 \to R_3 + \frac{1}{3} R_1$ $R_2 \to R_2 - 11R_4$

$$\begin{bmatrix} 1 & 0 & 5 \\ 0 & -3 & -21 \\ 0 & \frac{1}{3} & \frac{7}{3} \\ 0 & 0 & 0 \end{bmatrix}$$

Applying $R_2 \to -\frac{1}{3} R_2$, $R_3 \to 3R_3$

$$\begin{bmatrix} 1 & 0 & 5 \\ 0 & 1 & 7 \\ 0 & 1 & 7 \\ 0 & 0 & 0 \end{bmatrix}$$

Applying $R_3 \to R_3 - R_2$

$$\begin{bmatrix} 1 & 0 & 5 \\ 0 & 1 & 7 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$\therefore \text{RREM (A)} = \begin{bmatrix} 1 & 0 & 5 \\ 0 & 1 & 7 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

1.1.3. $\begin{bmatrix} 1 & 0 & 5 \\ 0 & 1 & 7 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$

$\therefore$ x + 5z = 0, y + 7z = 0
Take z = λ as a parameters then the solution set
{ (-5λ, -7λ , λ) (a is a parameter}

1.2. x + 2y + z + t = 1
x + 3z – 2t = 11
x – y + z = 8

Augmented matrix corresponding the above system of linear equations

$$\begin{bmatrix} 1 & 2 & 1 & 1 & 1 \\ 3 & 0 & 3 & -2 & 11 \\ 1 & -1 & 1 & 0 & 8 \end{bmatrix}$$

Applying $R_2 \to R_2 - 3R_1$, $R_3 \to R_3 \to R_1$

$$\begin{bmatrix} 1 & 2 & 1 & 1 & 1 \\ 0 & -6 & 0 & -3 & 8 \\ 0 & -3 & 0 & -1 & 7 \end{bmatrix}$$

Applying
$R_3 \to 2R_3 - R_2$

$$\left[\begin{array}{cccc|c} 1 & 2 & 1 & 1 & 1 \\ 0 & -6 & 0 & -5 & 8 \\ 0 & 0 & 0 & -3 & -6 \end{array}\right]$$

$$R_3 \to \frac{-1}{3} R_3 \left[\begin{array}{cccc|c} 1 & 2 & 1 & 1 & 1 \\ 0 & 6 & 0 & -5 & 8 \\ 0 & 0 & 0 & 1 & 2 \end{array}\right]$$

$R_1 \to R_1 - R_3$, $R_2 \to R_2 + 5R_3$

$$\left[\begin{array}{cccc|c} 1 & 2 & 1 & 0 & -1 \\ 0 & -6 & 0 & 0 & 18 \\ 0 & 0 & 0 & 1 & 2 \end{array}\right]$$

$$R_2 \to -\frac{-1}{6} R_2$$

$$\left[\begin{array}{cccc|c} 1 & 2 & 1 & 0 & -1 \\ 0 & 1 & 0 & 0 & -3 \\ 0 & 0 & 0 & 1 & 2 \end{array}\right]$$

Applying $R_1 \rightarrow R_1 \rightarrow 2R_2$

$$\left[\begin{array}{cccc|c} 1 & 0 & 1 & 0 & 5 \\ 0 & 1 & 0 & 0 & -3 \\ 0 & 0 & 0 & 1 & 2 \end{array}\right]$$

$\therefore$ solution, x + z = 5
y = -3
b = 2

take x = λ , λ is a parameter {(λ - -3, 5 – A, 2) : λ is free variable}

2. Definition

An $m \times n$ matrix A is said to have a rank r if it has at least one submatrix of order r which is non-singular but all submatrixs of order grater than r are singular.

2.1 Let A $\begin{bmatrix} 1 & 2 & 4 & 3 \\ 2 & 3 & 6 & 5 \\ 1 & -1 & -2 & 0 \end{bmatrix}$

The determinants of sub matrices of order 4 of A.

$$|A_1| = \begin{vmatrix} 2 & 4 & 3 \\ 3 & 6 & 5 \\ -1 & -2 & 0 \end{vmatrix} = 2\begin{vmatrix} 2 & 2 & 3 \\ 3 & 3 & 5 \\ -1 & -1 & 0 \end{vmatrix} = 0$$

$$|A_2| = \begin{vmatrix} 1 & 4 & 3 \\ 2 & 6 & 5 \\ 1 & -2 & 0 \end{vmatrix} = 2\begin{vmatrix} 1 & 2 & 3 \\ 2 & 3 & 5 \\ 1 & -1 & 0 \end{vmatrix}$$

$C_2 \rightarrow C_1 + C_2$

$$= 2\begin{vmatrix} 1 & 3 & 3 \\ 2 & 5 & 5 \\ 1 & 0 & 0 \end{vmatrix} = 0$$

$C_2 \to C_1 + C_2$

$$|A_3| = \begin{vmatrix} 1 & 2 & 3 \\ 2 & 3 & 5 \\ 1 & -1 & 0 \end{vmatrix} = \begin{vmatrix} 1 & 3 & 3 \\ 2 & 5 & 5 \\ 1 & 0 & 0 \end{vmatrix} = 0$$

$$|A_4| = \begin{vmatrix} 1 & 2 & 4 \\ 2 & 3 & 6 \\ 1 & -1 & -2 \end{vmatrix} = 2\begin{vmatrix} 1 & 2 & 2 \\ 2 & 3 & 3 \\ 1 & -1 & -1 \end{vmatrix} = 0$$

$\therefore$ The values of all the determinants of orders are zero and the sub matrix

$A^1 \begin{bmatrix} 2 & 3 \\ 1 & -1 \end{bmatrix}$ $\therefore |A^1| = -5 \neq 0$

$\therefore$ Rank A = 2

$$A = \begin{bmatrix} 1 & 2 & -1 & 0 \\ 4 & 3 & 2 & 1 \\ 6 & 7 & 0 & 1 \\ 7 & 9 & -1 & 1 \end{bmatrix}$$

Applying $R_2 \to R_2 - 4R_1$, $R_3 \to R_3 - 6R_1$, $R_4 \to R_4 - 7R_1$

$$\sim \begin{bmatrix} 1 & 2 & -1 & 0 \\ 0 & -5 & 6 & 1 \\ 0 & -5 & 6 & 1 \\ & & & \end{bmatrix}$$

Applying $R_4 \to R_4 - R_2$, $R_3 \to R_3 - R_2$, $R_2 \to -\frac{1}{5} R_2$

$$\begin{bmatrix} 1 & 2 & -1 & 0 \\ 0 & 1 & -\frac{6}{5} & \frac{1}{5} \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

$R_1 \to R_1 - 2R_2$

$$\begin{bmatrix} 1 & 0 & 7/5 & 2/5 \\ 0 & 1 & -6/5 & 1/5 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

2.3.1. $x + 2y = \alpha$
$3x + y = \beta$
$2x - y = \gamma$

The augmented matrix is

$$\begin{bmatrix} 1 & 2 & \alpha \\ 3 & 1 & \beta \\ 3 & -1 & \gamma \end{bmatrix}$$

Applying $R_2 \to R_2 - 3R_1$, $R_3 \to R_3 - 2R_1$

$$\begin{bmatrix} 1 & 2 & \alpha \\ 0 & -5 & \beta-3\alpha \\ 0 & -5 & \gamma-2\alpha \end{bmatrix}$$

Applying $R_3 \to R_3 - R_2$

$$\begin{bmatrix} 1 & 2 & \alpha \\ 0 & -5 & \beta-3\alpha \\ 0 & 0 & \alpha+\gamma-\beta \end{bmatrix}$$

The system is consistent if and only if
$\alpha + \gamma - \beta = 0$ i. e. $\beta = \alpha + \gamma$
If $\beta = \alpha + \gamma$

$$\begin{bmatrix} 1 & 2 & \alpha \\ 0 & -5 & \alpha+\gamma-3\alpha \\ 0 & 0 & 0 \end{bmatrix}$$ if $\beta \neq \alpha + \gamma$. The system is inconsistent no solutions.

$$R_2 \to -\frac{1}{5}R_2 \begin{bmatrix} 1 & 2 & \alpha \\ 0 & 1 & \dfrac{-\gamma+2\alpha}{5} \\ 0 & 0 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 2 & -3 & 4 \\ 3 & -1 & 5 & 2 \\ 4 & 1 & \mu^2-14 & \mu+2 \end{bmatrix}$$

Applying $R_2 \to R_2 - 3R_1$ and $R_3 - 4R_1$

$$\begin{bmatrix} 1 & 2 & -3 & 4 \\ 0 & -7 & 14 & -10 \\ 0 & -7 & \mu^2-2 & \mu-14 \end{bmatrix}$$

Applying $R_1 \to R_2 - 2R_2$, $R_3 \to R_3 - R_2$ and $R_2 \to -\frac{1}{7}R_2$

$$\begin{bmatrix} 1 & 2 & -3 & 4 \\ 0 & 1 & -2 & \frac{10}{7} \\ 0 & 0 & \mu^2-16 & \mu-4 \end{bmatrix}$$

Applying $R_1 \to R_1 - 2R_2$

$$\begin{bmatrix} 1 & 0 & 1 & \frac{8}{7} \\ 0 & 1 & -2 & \frac{10}{7} \\ 0 & 0 & \mu^2-16 & \mu-4 \end{bmatrix}$$

Case one $\mu^2 - 16 \neq 0$ that is $\mu \neq \pm 4$ Applying $R_3 \to \frac{1}{\mu^2-16} R_3$

$$\begin{bmatrix} 1 & 0 & 1 & \frac{8}{7} \\ 0 & 1 & -2 & \frac{10}{7} \\ 0 & 0 & 1 & \frac{\mu-4}{\mu^2-16} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 1 & \frac{8}{7} \\ 0 & 1 & -2 & \frac{10}{7} \\ 0 & 0 & 1 & \frac{1}{\mu+4} \end{bmatrix}$$

Applying $R_1 \to R_2 - R_3$ and $R_2 \to R_2 + 2R_3$

$$\begin{bmatrix} 1 & 0 & 0 & \frac{8\mu+25}{7(\mu+4)} \\ 0 & 1 & 0 & \frac{10\mu+54}{7(\mu+4)} \\ 0 & 0 & 1 & \frac{1}{\mu+4} \end{bmatrix}$$

If $\mu \neq 4$ the system has unique solution $x = \frac{8\mu+25}{7(\mu+4)}, y = \frac{10\mu+54}{7(\mu+4)}, z = \frac{1}{\mu+4}$

Case $2\mu = -4$

$$\begin{bmatrix} 1 & 2 & -3 & 4 \\ 0 & 1 & -2 & \frac{10}{7} \\ 0 & 0 & 0 & -8 \end{bmatrix}$$ then the system is inconsistent no solution

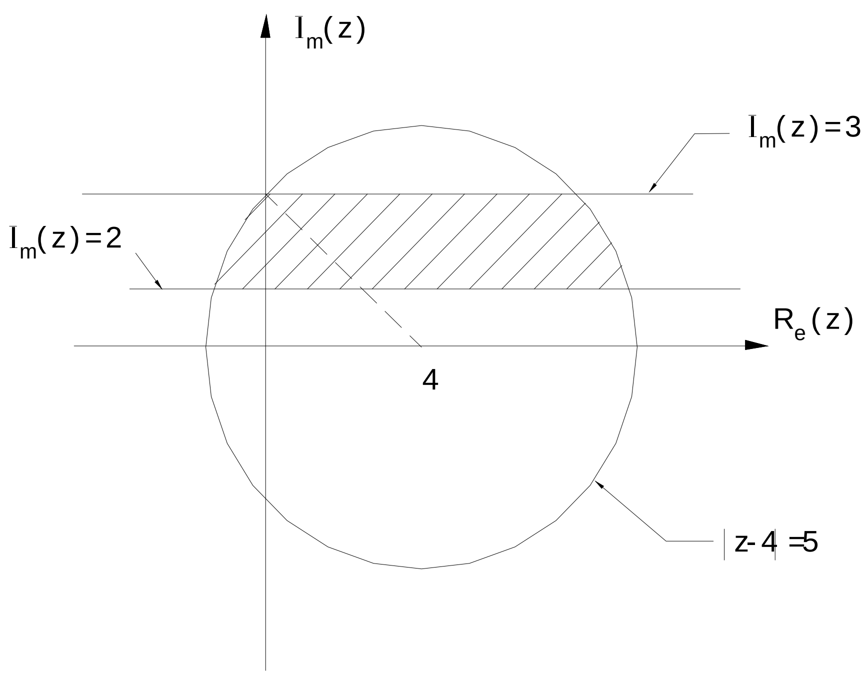
$\mu = 4$

$$\begin{bmatrix} 1 & 2 & -3 & 4 \\ 0 & 1 & -2 & \frac{10}{7} \\ 0 & 0 & 0 & 0 \end{bmatrix}$$ then the system is consistent the solution and infinitely many solutions

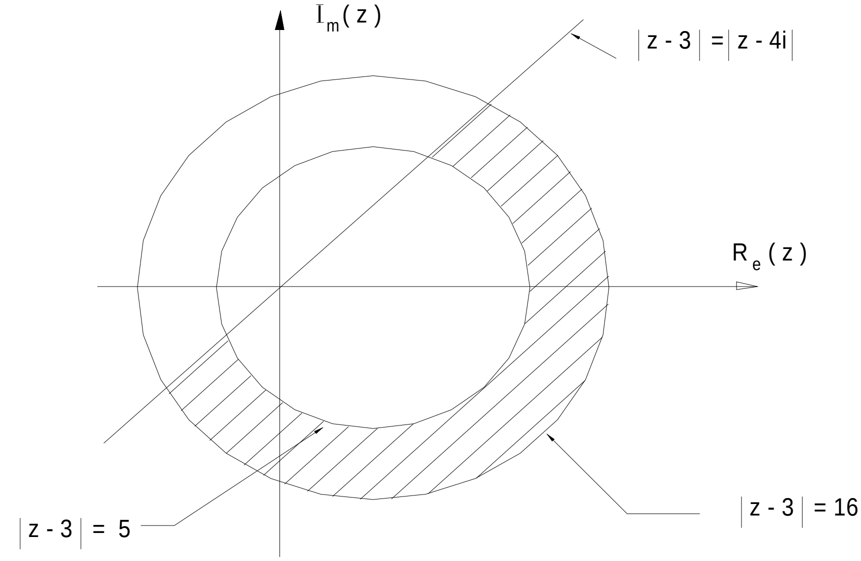
$x = \frac{8}{7} - z, y = \frac{10}{7} + 2z$ and z can take any value

3.1

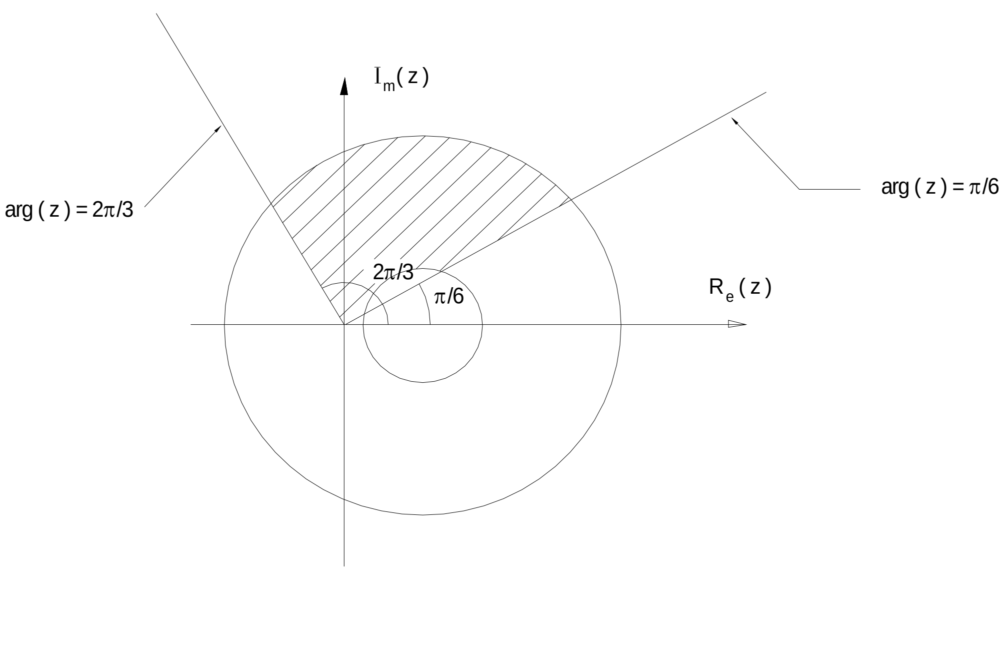
3.1.1. $|z-4| \leq 5$ & $2 \leq I_m(z) \leq 3$



3.1.2. $5 \le |\ z - 3\ | \le 16$ & $|\ z - 3\ | \le z - 4i\ |$



3.1.3.



3.2. Log (4 + 3i)

$$4 + 3i = 5\left(\frac{4}{5} + i\frac{3}{5}\right)$$

$$\alpha = \tan^{-1}\left(3/4\right)$$

3 + 3i = 5(cos α + i sinα)

$$= 5\left[\cos\left(2h\pi + \alpha\right) + i\sin\left(2h\pi + \alpha\right)\right]$$

$$4 + 3i = 5e^{(2h\pi+\alpha)^{i}}\left(2h\pi + \alpha\right)i$$

3.2 Log (4 + 3i)

$$4 + 3i = 5\left(\frac{4}{5} + i\frac{3}{5}\right)$$

$$\alpha + \tan^{-1}\left(3/4\right)$$

$$4 + 3i = 5(Cos\alpha + i\sin\alpha)$$

$$4 + 3i = 5\left[\cos\left(2h\pi\right) + i\sin\left(2h\pi\right)\right]$$

$$4 + 3i = 5e^{(2h\pi+\alpha)i}$$

$$\text{Log}(4 + 3i) = \text{Log}5e^{(2h\pi + \alpha)i}$$

$$= \ln 5 + (2h\pi + \alpha)$$

3.2.2. $(1 + i)^i$

$$1 + i = \sqrt{2}\left(\cos\frac{\pi}{4} + i\sin\frac{\pi}{4}\right)$$

$$= \sqrt{2}\left[\cos\left(2h\pi + \frac{\pi}{4}\right) + i\sin\left(2h\pi + \frac{\pi}{4}\right)\right]$$

$$1 + i = \sqrt{2}\ e^{\left(2h\pi + \frac{\pi}{4}\right)i}$$

$$\therefore \text{Log}\left(1 + i\right) = \ell n\sqrt{2} + \left(2h\pi + \frac{\pi}{4}\right)i$$

$$i\ \log\,(1 + i) = i\ \ell n\sqrt{2} - \left(2h\pi + \frac{\pi}{4}\right)$$

$$\text{Log}\,(1 + i)^I = i\ \ell n\sqrt{2} - \left(2h\pi + \pi/4\right)$$

$$(1 + i)^i = e^{i\ \ell n\sqrt{2} - 2h\pi - \pi/4}$$

$$= e^{i\ \ell n\sqrt{2} - (2h+1)\pi/4}$$

3.3.

$$f(z)=\frac{3z+4}{z-1}\; z\neq 1$$

Let , z_1, z_2 $\in D_f$

$$f(z_1)=f(z_2)\Leftrightarrow \frac{3z_1+4}{z_1-1}=\frac{3z_2+4}{z_2-1}$$

$\Leftrightarrow 3z_1z_2 + 4z_2 - 3z_2 - 3z_1 - 4 = 3z_1z_2 + 4z_1 - 3z_2 - 4$

$\Leftrightarrow 7z_1 = 7z_2$

$\Leftrightarrow z_1 = z_2$

$\therefore$ f(z) is one to one

Suppose $y = f(z) \Leftrightarrow z = f^{-1}(y)$ $z \neq 1$

$$y=\frac{3z+4}{z-1}\Leftrightarrow\; yz - y = 2z + 4$$

$$\Leftrightarrow (y-2)\, z = y + 4$$

Clearly $y \neq 2$ $z = \frac{y+4}{y-2}$

$$\therefore f^{-1}(y)=\frac{y+4}{y-2}$$

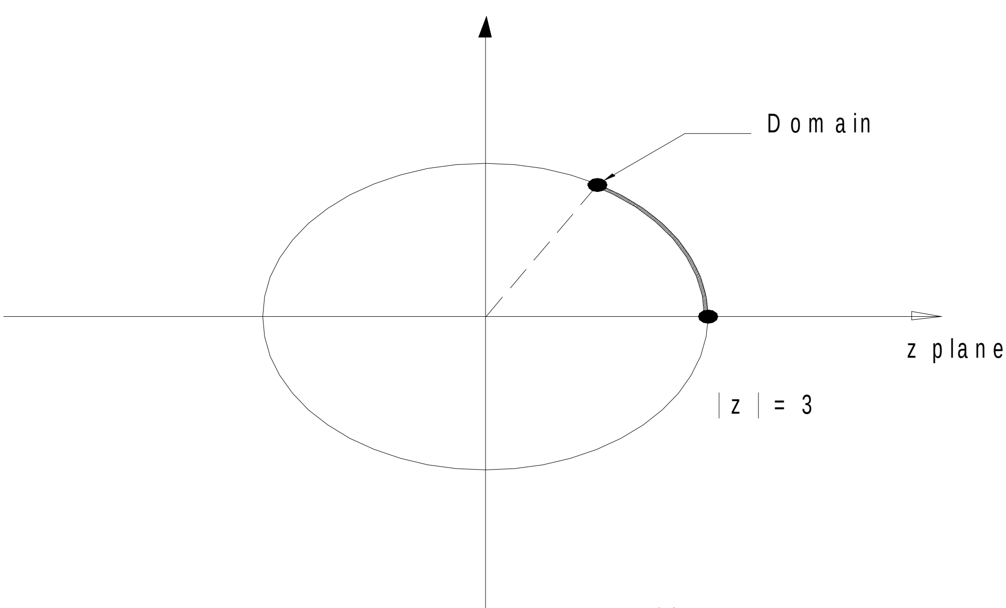
$$\therefore f^{-1}(z)=\frac{z+4}{z-2}\qquad z\neq 2$$

3.4

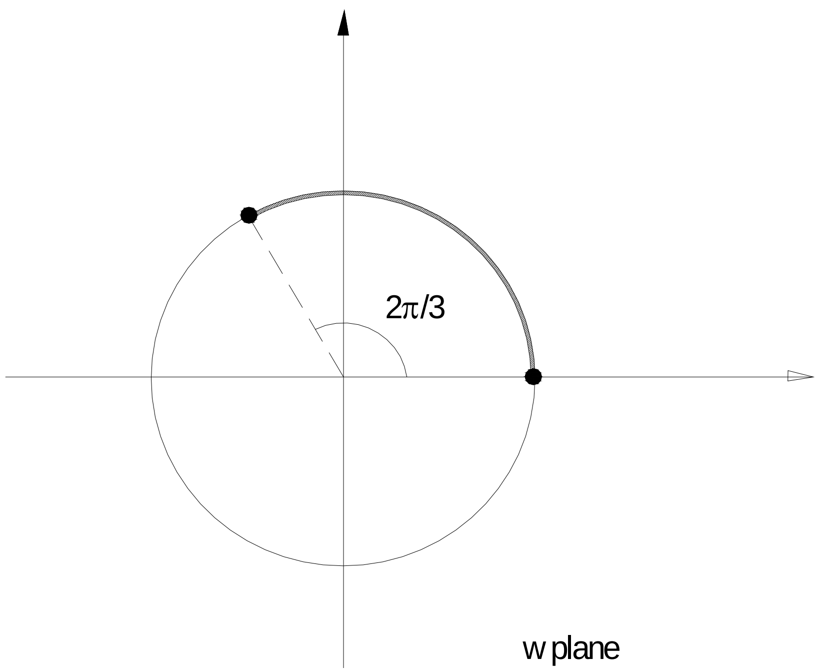
$f(z) = z^2$, $|\, z \,| = 3$

$0 \leq \arg(z) \leq \pi/3$

Domain f(z)



$W = z^2$
$\arg w = \arg z^2 = 2\arg z$
$|w| = |z^2| \; 2 \; |z|^2 = 3^2$
Image $0 \le \arg \le {}^{3}\!/\!{}_{\pi}$
$0 \le 2\arg(z) \le \frac{2\pi}{3}$
$0 \le \arg(w) \le \frac{2\pi}{3}$
$|w| = 9$



4.1

$x \sim Bin(n, p)$
$\therefore M(t) = \sum_{x=0}^{n} n_{C_x} p^x q^{\pi - x} e^{t-x}$
$= \sum_{x=0}^{n} n_{C_x} \left(pe^t\right)^x q^{n-x}$
$= (pe^t + q)^n$
Since $p + q = 1$

$M(t) = (pe^t + 1\text{-}p)^n$
$M^1(t) = n(pe^t + 1\text{-}p)^{n-1}\ pe^6$
$M^1(0) = E(x) = n\ (pe^0 + 1\text{-}p)pe^0$
$E(x) = np$
$M^2\ (t) = MPe^t\ (pe^t + \ 1\text{-}\ p)^{n-1} + npe^t\ (pe^t + 1 – p)^{n-2}\ (n – 1)pe^t$
$M^2(c) = E(x^2) = np\ (p + 1 – p) + n\ (n – 1)\ p^2(\ p + 1 – p)$
$= np + n(n – 1)\ p^2$
$V(x) = E(x^2) – (E(x))^2$
$= np + n^2p^2 – np^2 – n^2p^2$
$= np\ (1 – P)$

n – number of toffees of a packet

4.2.

np = 11 ---------- (1)
np (1 – p) = 4.95
11 (1 – p) = 4.95
1 – p = 0.45
P = 1 – 0.45
P = 0.55
n . (0.55) = 11

$$n = \frac{11}{0.55} = \frac{1100}{55} = 20$$

n = 20

4.2.2.

$$p\left(X = x\right) = {}^{20}C_x p^x (1 - p)^{20-x}$$

$$p(x = 8) = {}^{20}C_8 \left(0.55\right)^z \left(0.45\right)^{12}$$

4.2.3. Number of mango toffees in a packet n = 100
probability of a mango toffee
p = 0.3
probability of a another toffees
p = 1 – 0.3 = 0.7
$\therefore$ X ~ Bin (n > p)
Mean = np = 100. 0.3 = 30
Variance = npq = 100.0.3×0.7=21
Using normal distribution
X ~ N (30, 21)

$\therefore$ p (x < 3.5)
Using continuity connection
P (x < 34.5)

$$= p\left(\frac{x-\mu}{\sigma} < \frac{34.5-\mu}{6}\right)$$

$$= p\left(z < \frac{34.5-30}{\sqrt{21}}\right) \quad z \sim N(b,1)$$

= p(z < 0.982)
= ϕ(0.982) ($\because$ p (z < a) = ϕ(a))
= 0.832

$(x - \mu)^2 - 2\sigma^2$ tx
$= x^2 - 2(\mu + \sigma^2 t)x + \mu^2$
$= (x - \mu - \sigma^2 t) + \mu^2 - (\mu + \sigma^2 t)^2$
$= (x - \mu - \sigma^2 t)^2 + \mu^2 - \mu^2 - 2\mu\sigma^2 t - \sigma^4 t^2$
$= (x - \mu - \sigma^2 t)^2 - (2\mu\sigma^2 t + \sigma^4 t^2)$

$M(t) = E(e^{tx})$

$$= \int_{-\alpha}^{\alpha} \frac{1}{\sqrt{2\pi 6}} e^{-\frac{1}{2\sigma^2}(x-\mu)^2} e^{tx} dx$$

$$= \int_{-\alpha}^{\alpha} \frac{1}{\sqrt{2\pi\sigma}} e^{-\frac{1}{2\sigma^2}} (x-\mu)^2 + tx$$

$$= \int_{-\alpha}^{\alpha} \frac{1}{\sqrt{2\pi\sigma}} e^{-\frac{1}{2\sigma^2}} \left[(x-\mu)^2 - 2\sigma tx\right] dx$$

$$= \int_{-\alpha}^{\alpha} \frac{1}{\sqrt{2\pi\sigma}} e^{-\frac{1}{2\sigma^2}} (x-\mu-\sigma^2 t)^2 (2\mu\sigma^2 t + \sigma^4 t^2) dx$$

$$= e^{-\frac{1}{2\sigma^2}} (-2\mu\sigma^2 t - \sigma^4 t^2) \int_{-\alpha}^{\alpha} \frac{1}{\sqrt{2\pi\sigma}} e^{-\frac{1}{2\sigma^2}} (x-\mu-\sigma^2 t)^2 dx$$

$$M(t) = e^{-\mu t + \frac{\sigma^2 t^2}{2}}$$

$$M^1(t) = e^{\mu t + \frac{\sigma^2 t}{2}} \left(\mu + \frac{2\sigma^2 t}{2}\right)$$

$M^1(0) = \mu \ \therefore E(x) = \mu$

$$M^2(t) = e^{\mu t + \frac{\sigma^2 t}{2}} (\mu + \sigma^2 t)^2 + e^{\mu t + \frac{\sigma^2 t}{2}} (\sigma^2)$$

$M^2(c) = \mu^2 + \sigma^2$ $E(x^2)^2 = \mu^2 + \sigma^2$
$V(x) = E(x) - (E(x))^2 = \mu^2 + \sigma^2 - \mu^2 = \sigma^2$

Suppose the random variable X is the time taken to germinate a one seed

Then p(x > 6) = 0.2 and p(x < 4) = 0.1

Taking μ and σ^2 as mean and variance of X $Z = \frac{x-\mu}{a}$

Using the standard normal variable Z

$$P\left(Z > \frac{\sigma-\mu}{\sigma}\right) = 0.2 \quad .... \quad (1)$$

$$P\left(Z < \frac{4-\mu}{\sigma}\right) = 0.1-----[2]$$

Using (1) $P\left(Z < \frac{\sigma-\mu}{\sigma}\right) = 0.8$ .... [3]

Since $\frac{4-\mu}{\sigma}$ is less than the mean value, so it is negative

From the symmetry of the z – curve

$$P\left(Z < \frac{4-\mu}{\sigma}\right) = p\left(Z > \frac{\mu-4}{\sigma}\right) = 0.1$$

$$P\left(Z < \frac{\mu-4}{\sigma}\right) = 0.9 \quad ....[4]$$

From the z – tables taking the nearest value of z giving these probabilities

From equation [3] $\frac{6-\mu}{\sigma} = 0.84$ .... [5]

From equation [4] $\frac{\mu-4}{\sigma} = 1.28$ .... [6]

From the equations [5] and [6] μ = 5.208 and σ = 0.943

σ = 6cm and μ = 140 cm

Let x be the height of a tree then

$$P(x < 145) = P\left(\frac{X-140}{6} < \frac{145-140}{6}\right) = P\left(Z < \frac{5}{6}\right)$$

$$P(x < 145) = P\left(Z < \frac{5}{6}\right) = P(Z < 0.833) = 0.7976$$

Let Y be the number if trees in the sample that is less than 145 cm tall. Then Y can the value in the set {0, 1, 2, 3, 4, 5}

Clearly Y has a Binomial distribution with n = 5 and p = 0.7976

P(y = 5) = $(0.7976)^5$ = 0.323

P(y = 3) = $C^5{}_3\,(1 - 0.7976)^2\,(0.7976)^3$